Fig.1

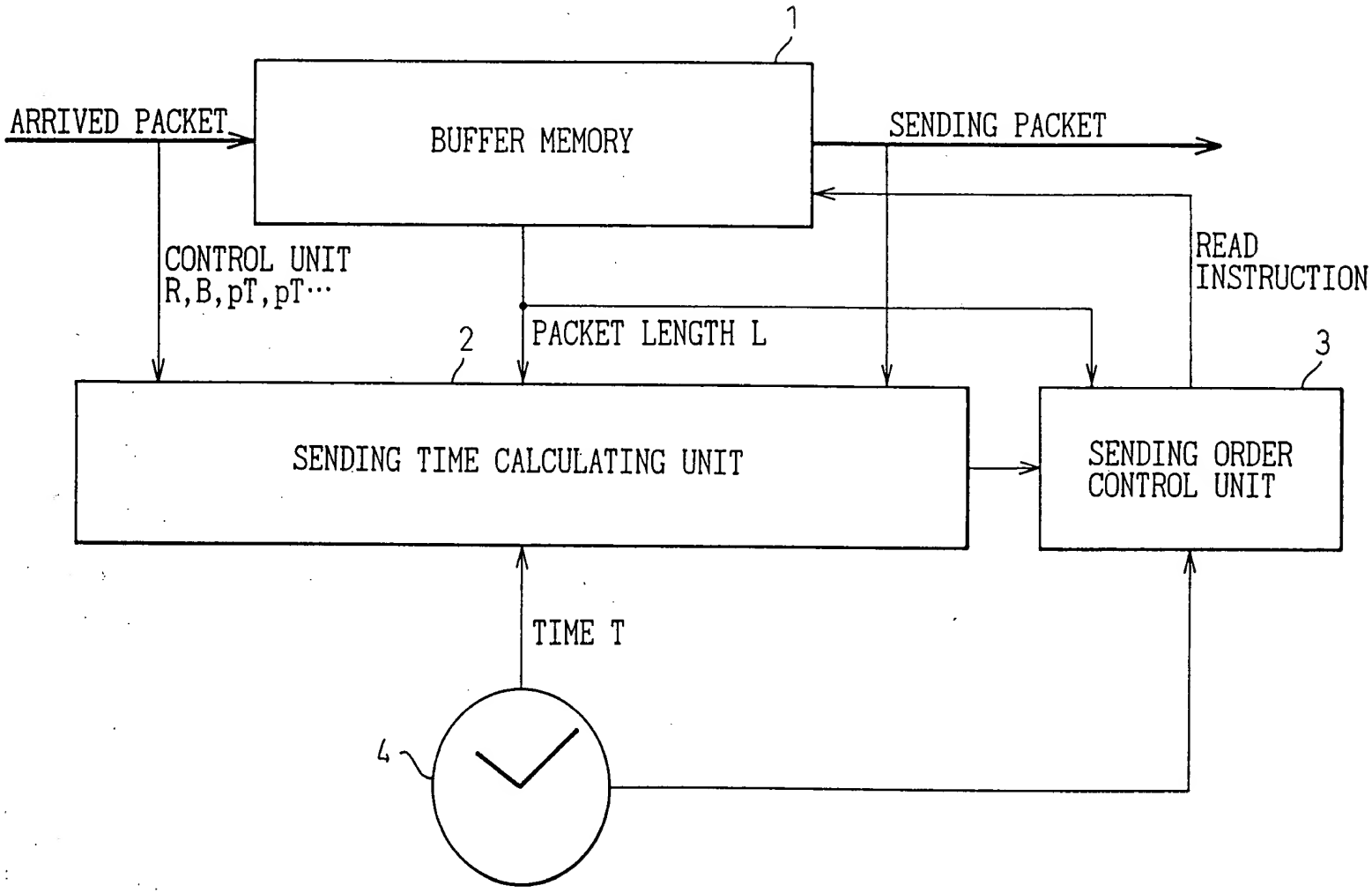


Fig.2

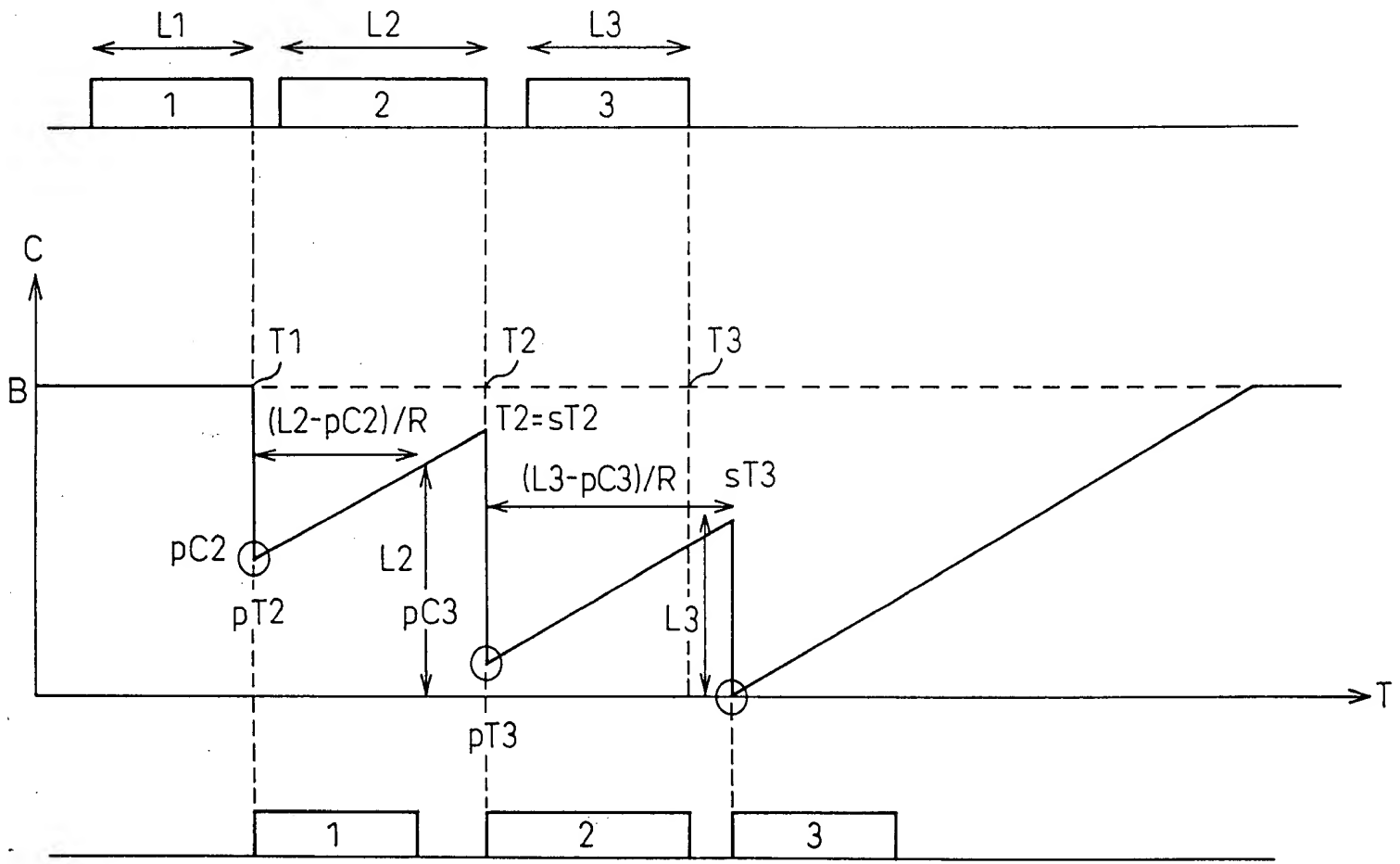


Fig.3

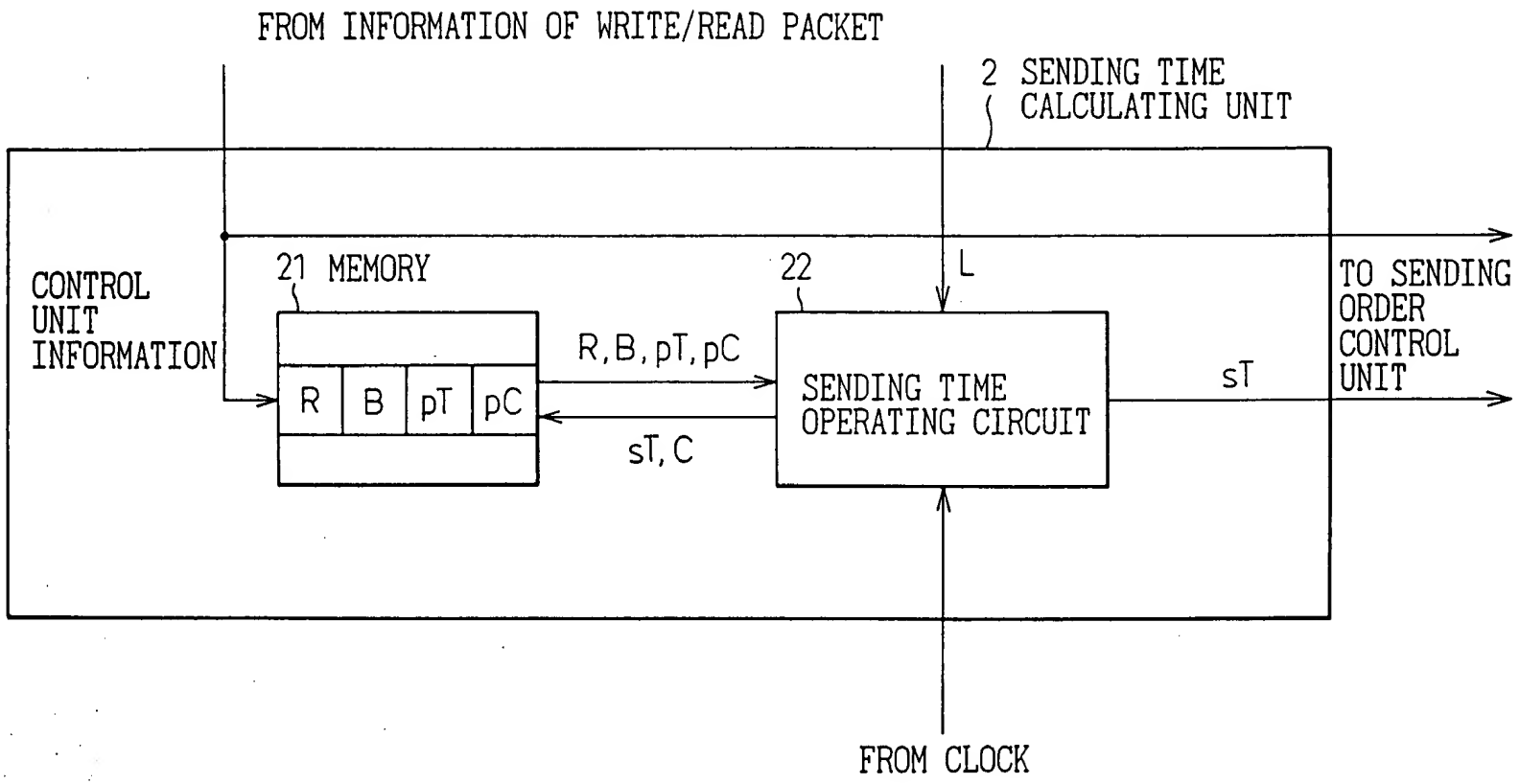


Fig.4

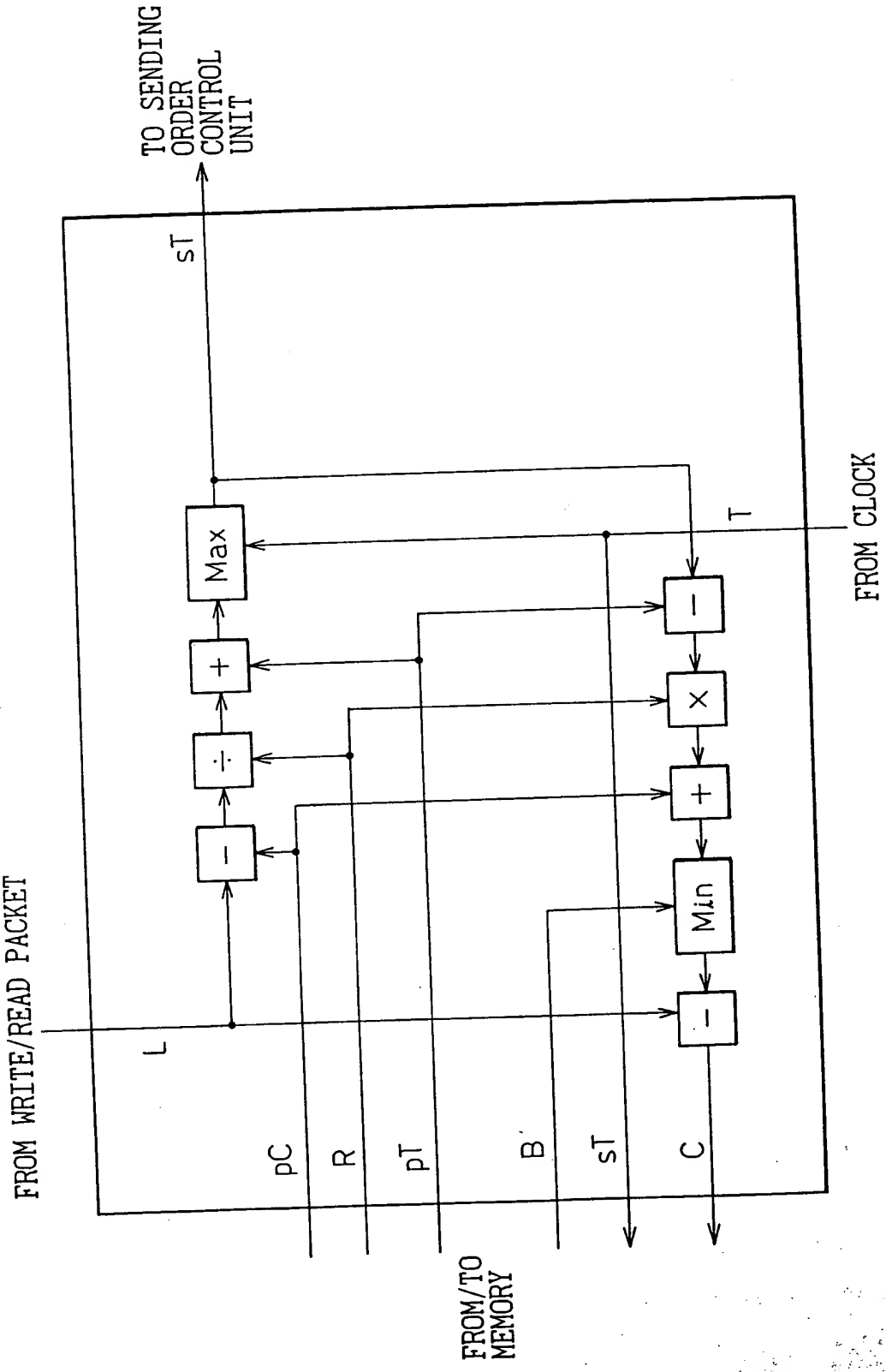

TO SENDING ORDER CONTROL UNIT
sT
Max
+
÷
−
FROM WRITE/READ PACKET
L
pC
R
pT
FROM/TO MEMORY
B'
sT
C
Min
+
×
−
T
FROM CLOCK

Fig.5

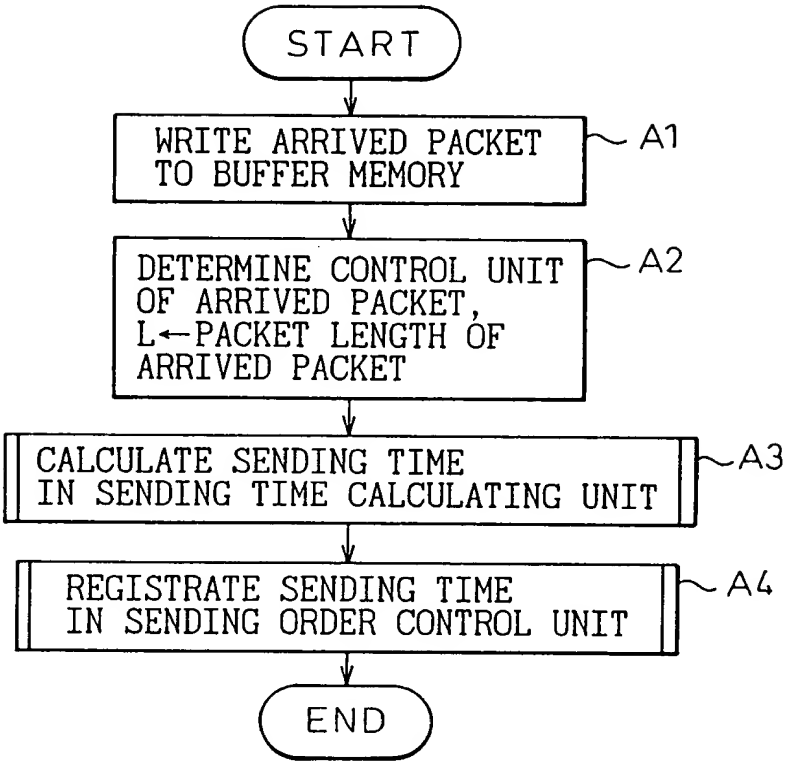

START
WRITE ARRIVED PACKET TO BUFFER MEMORY
A1
DETERMINE CONTROL UNIT OF ARRIVED PACKET, L←PACKET LENGTH OF ARRIVED PACKET
A2
CALCULATE SENDING TIME IN SENDING TIME CALCULATING UNIT
A3
REGISTRATE SENDING TIME IN SENDING ORDER CONTROL UNIT
A4
END

Fig.6

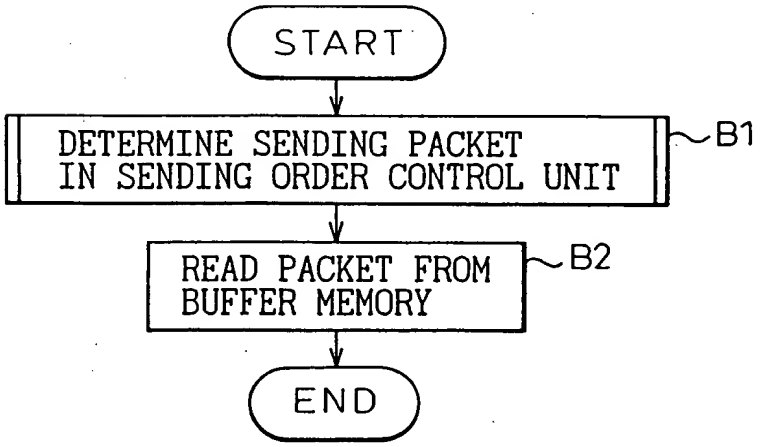

START
DETERMINE SENDING PACKET IN SENDING ORDER CONTROL UNIT
B1
READ PACKET FROM BUFFER MEMORY
B2
END

Fig.7

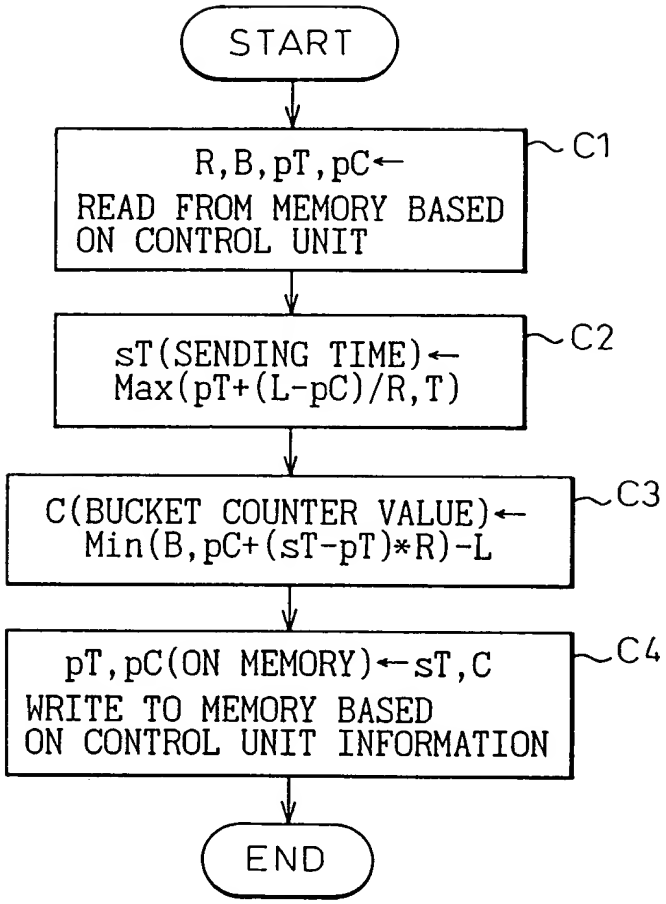

START
R,B,pT,pC←
READ FROM MEMORY BASED ON CONTROL UNIT
C1
sT(SENDING TIME)←
Max(pT+(L-pC)/R,T)
C2
C(BUCKET COUNTER VALUE)←
Min(B,pC+(sT-pT)*R)-L
C3
pT,pC(ON MEMORY)←sT,C
WRITE TO MEMORY BASED ON CONTROL UNIT INFORMATION
C4
END

Fig.8

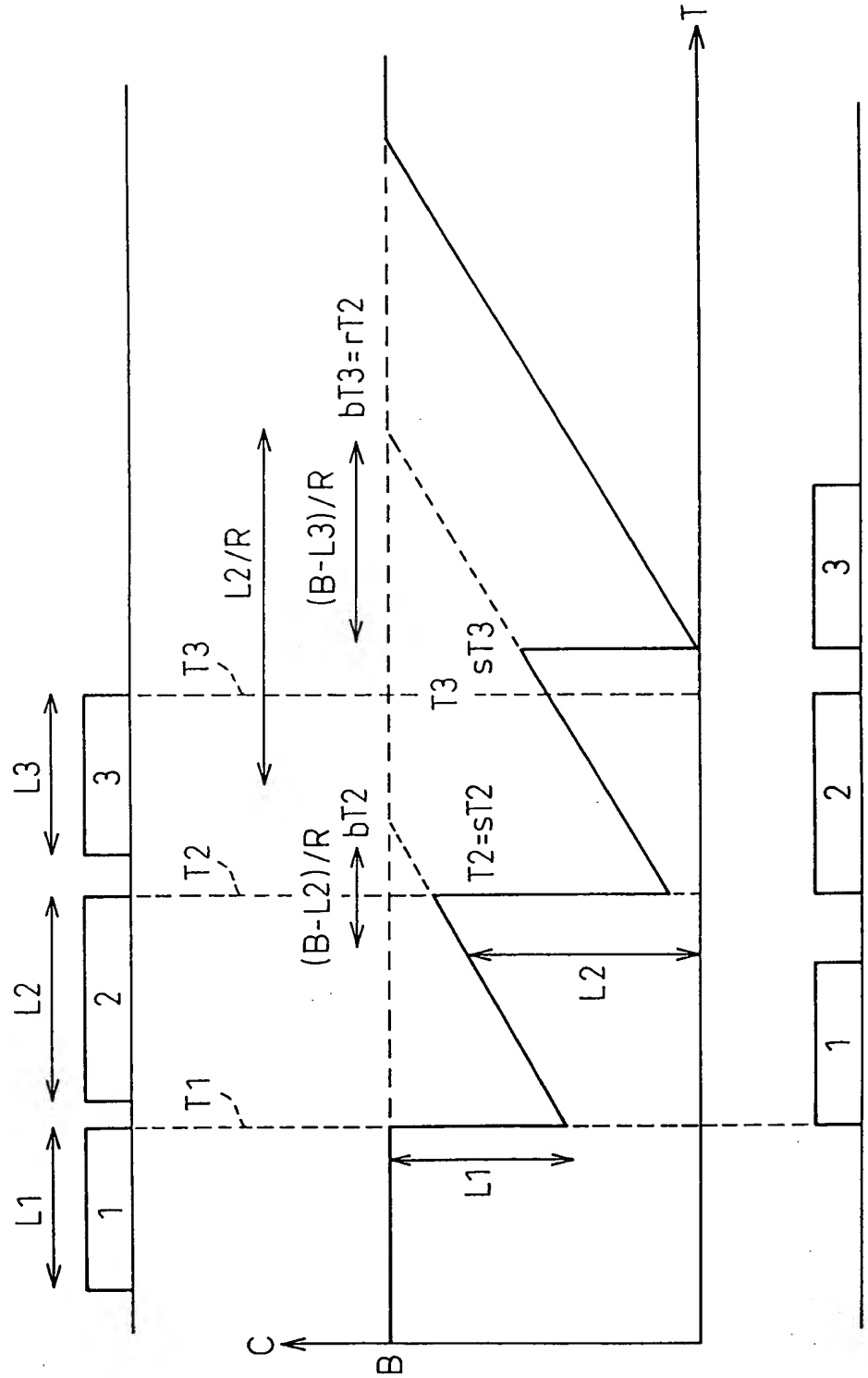


Fig.9

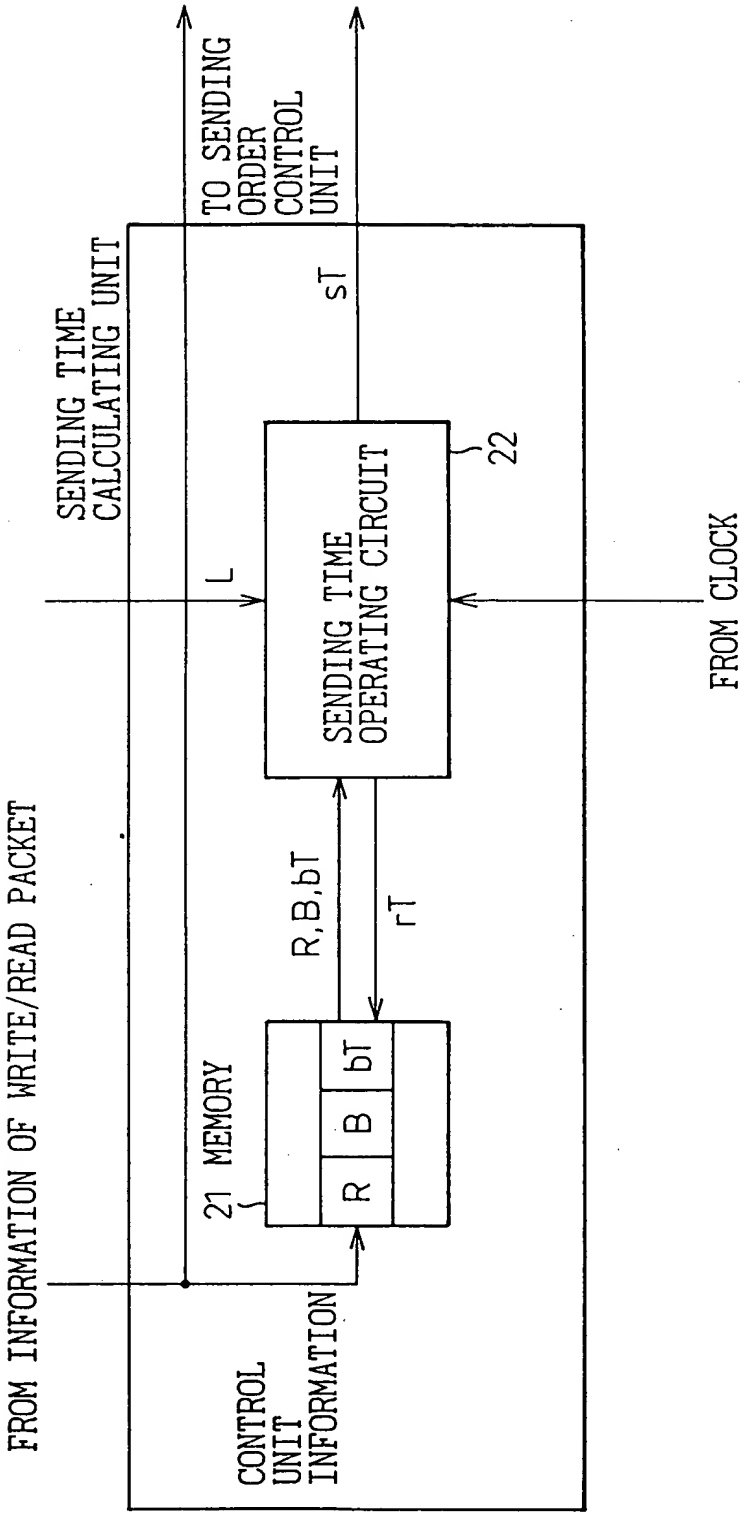

SENDING TIME CALCULATING UNIT
TO SENDING ORDER CONTROL UNIT
sT
L
SENDING TIME OPERATING CIRCUIT
22
FROM CLOCK
R,B,bT
rT
21 MEMORY
R
B
bT
FROM INFORMATION OF WRITE/READ PACKET
CONTROL UNIT INFORMATION

Fig.10

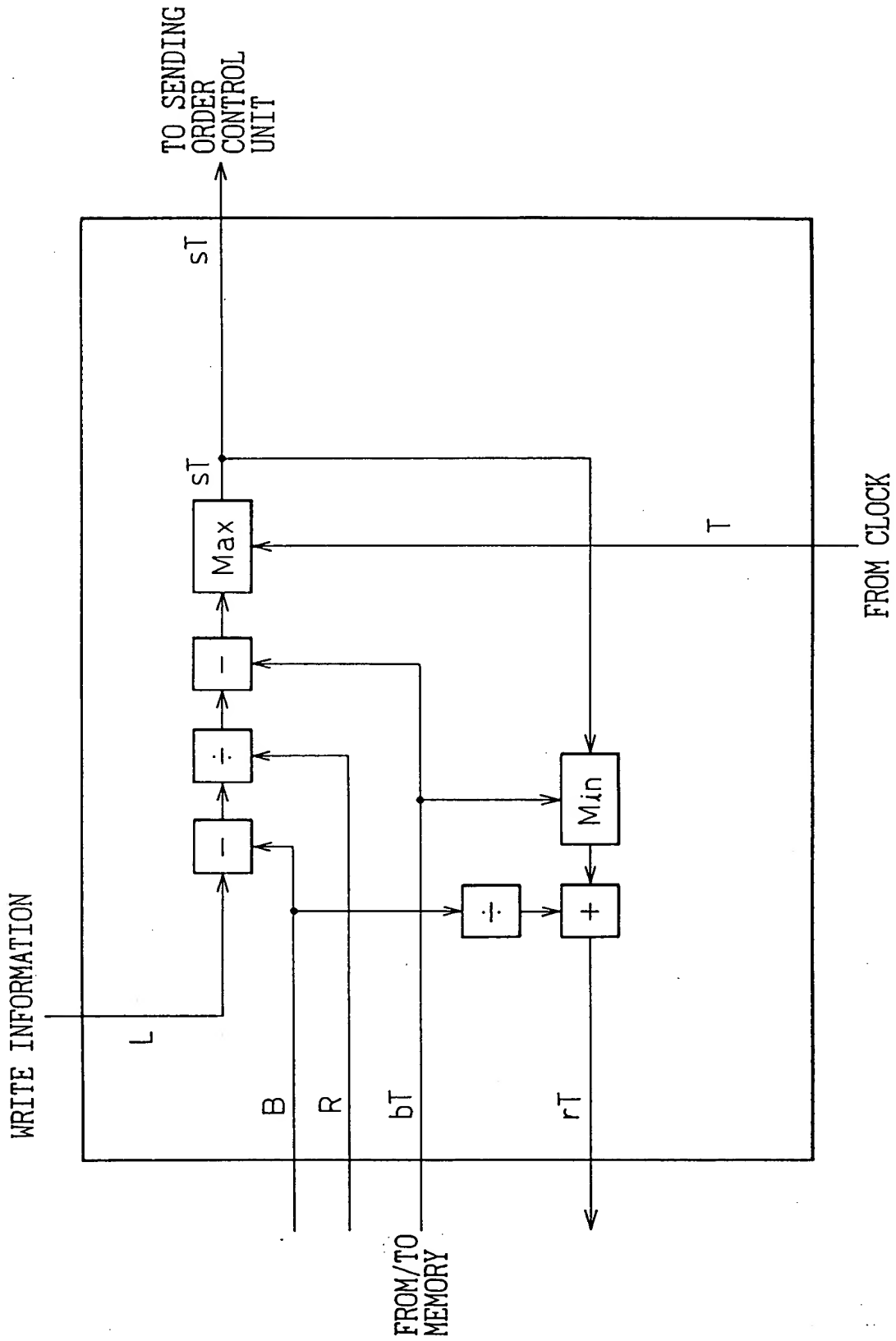

TO SENDING ORDER CONTROL UNIT
sT
sT
Max
T
FROM CLOCK
−
÷
−
Min
÷
+
WRITE INFORMATION
L
B
R
bT
rT
FROM/TO MEMORY

Fig.11

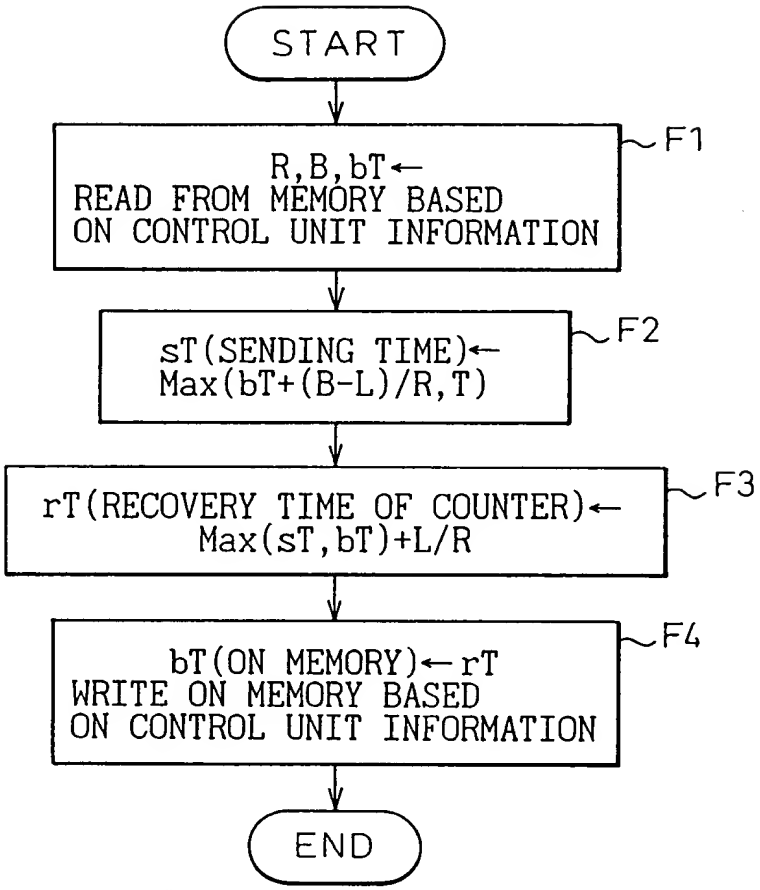

START
R,B,bT←
READ FROM MEMORY BASED
ON CONTROL UNIT INFORMATION
F1
sT(SENDING TIME)←
Max(bT+(B-L)/R,T)
F2
rT(RECOVERY TIME OF COUNTER)←
Max(sT,bT)+L/R
F3
bT(ON MEMORY)←rT
WRITE ON MEMORY BASED
ON CONTROL UNIT INFORMATION
F4
END

Fig.12

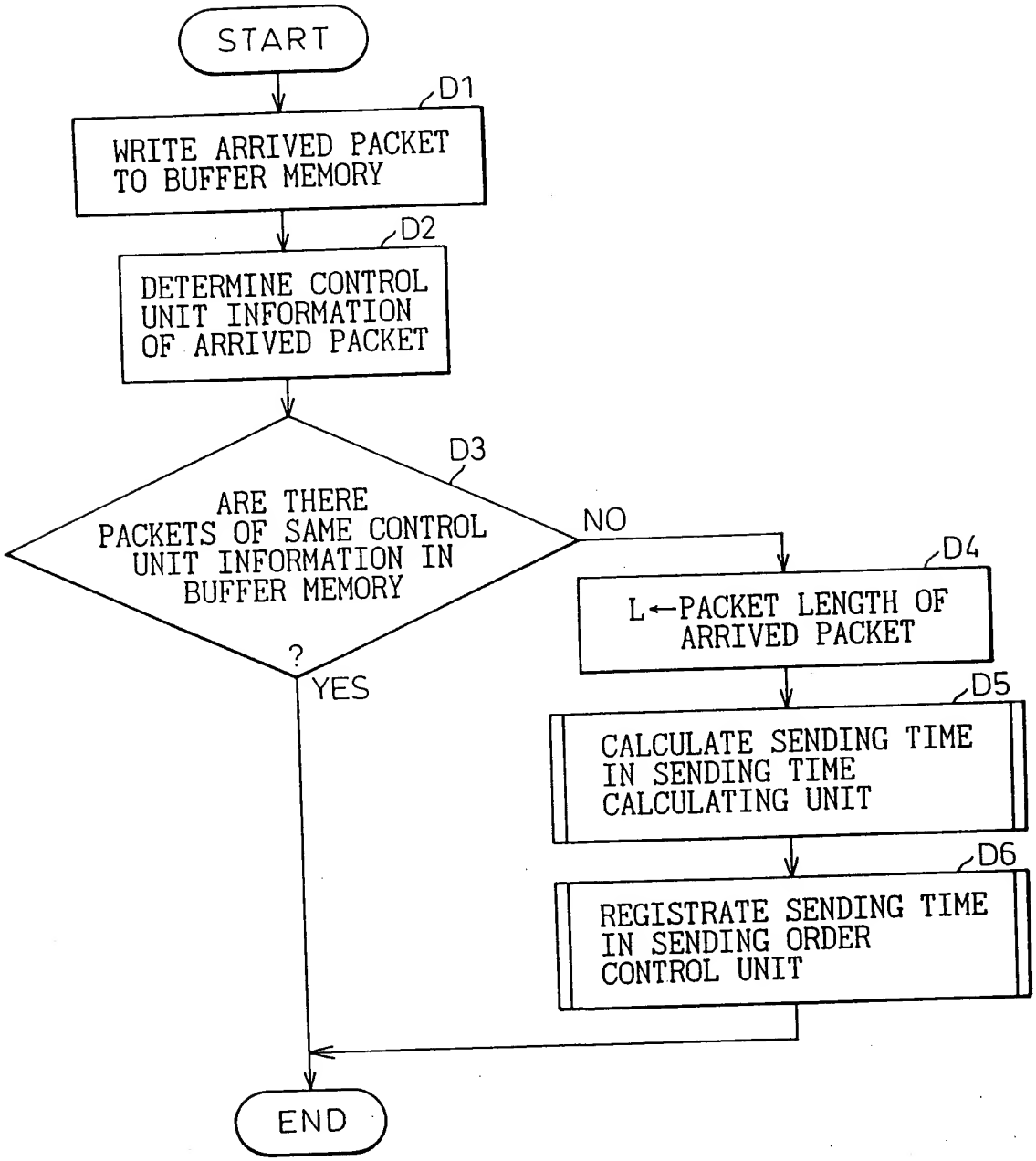

START
D1
WRITE ARRIVED PACKET TO BUFFER MEMORY
D2
DETERMINE CONTROL UNIT INFORMATION OF ARRIVED PACKET
D3
ARE THERE PACKETS OF SAME CONTROL UNIT INFORMATION IN BUFFER MEMORY
?
NO
YES
D4
L←PACKET LENGTH OF ARRIVED PACKET
D5
CALCULATE SENDING TIME IN SENDING TIME CALCULATING UNIT
D6
REGISTRATE SENDING TIME IN SENDING ORDER CONTROL UNIT
END

Fig.13

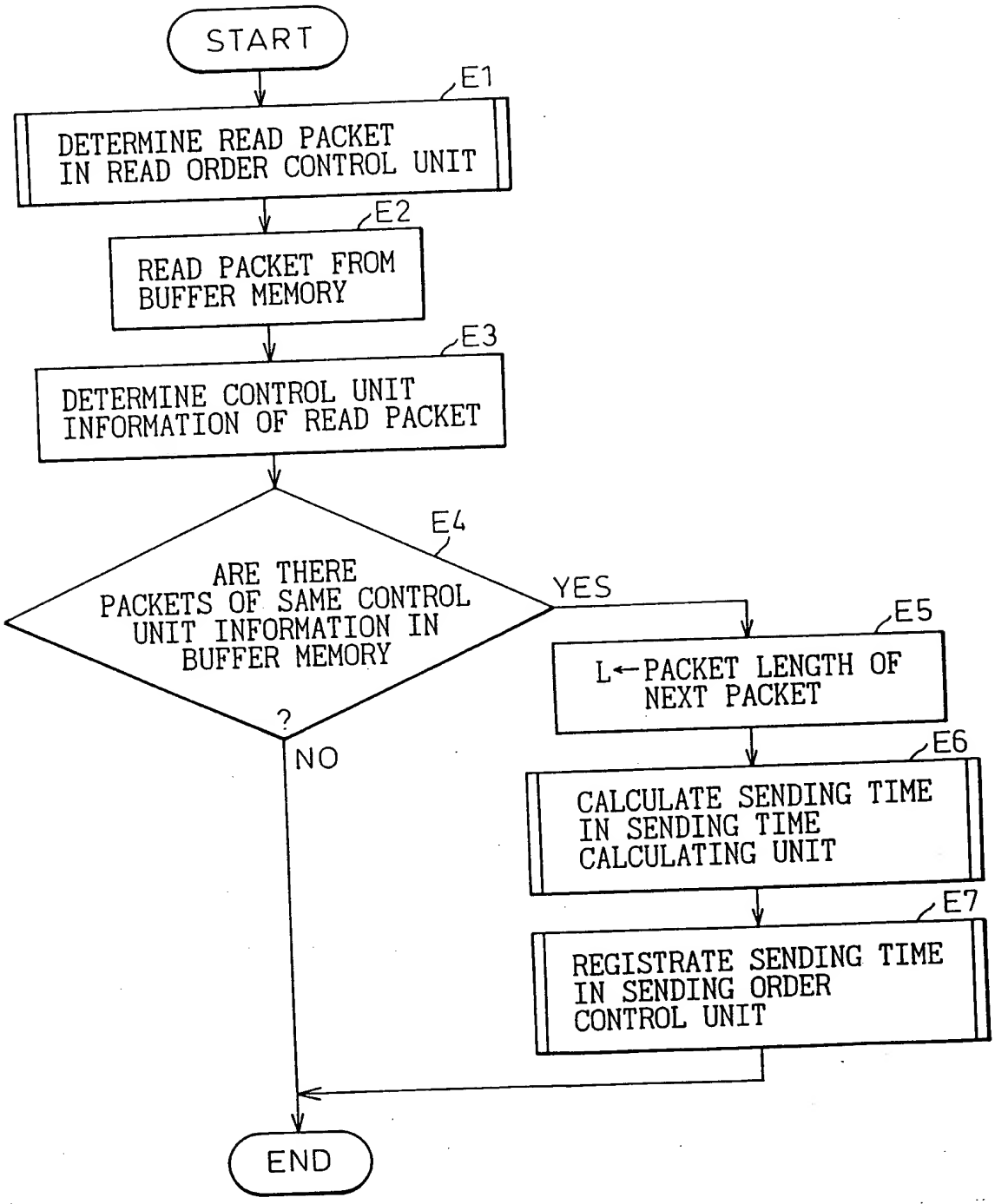

START
E1
DETERMINE READ PACKET IN READ ORDER CONTROL UNIT
E2
READ PACKET FROM BUFFER MEMORY
E3
DETERMINE CONTROL UNIT INFORMATION OF READ PACKET
E4
ARE THERE PACKETS OF SAME CONTROL UNIT INFORMATION IN BUFFER MEMORY ?
YES
NO
E5
L←PACKET LENGTH OF NEXT PACKET
E6
CALCULATE SENDING TIME IN SENDING TIME CALCULATING UNIT
E7
REGISTRATE SENDING TIME IN SENDING ORDER CONTROL UNIT
END

Fig.14

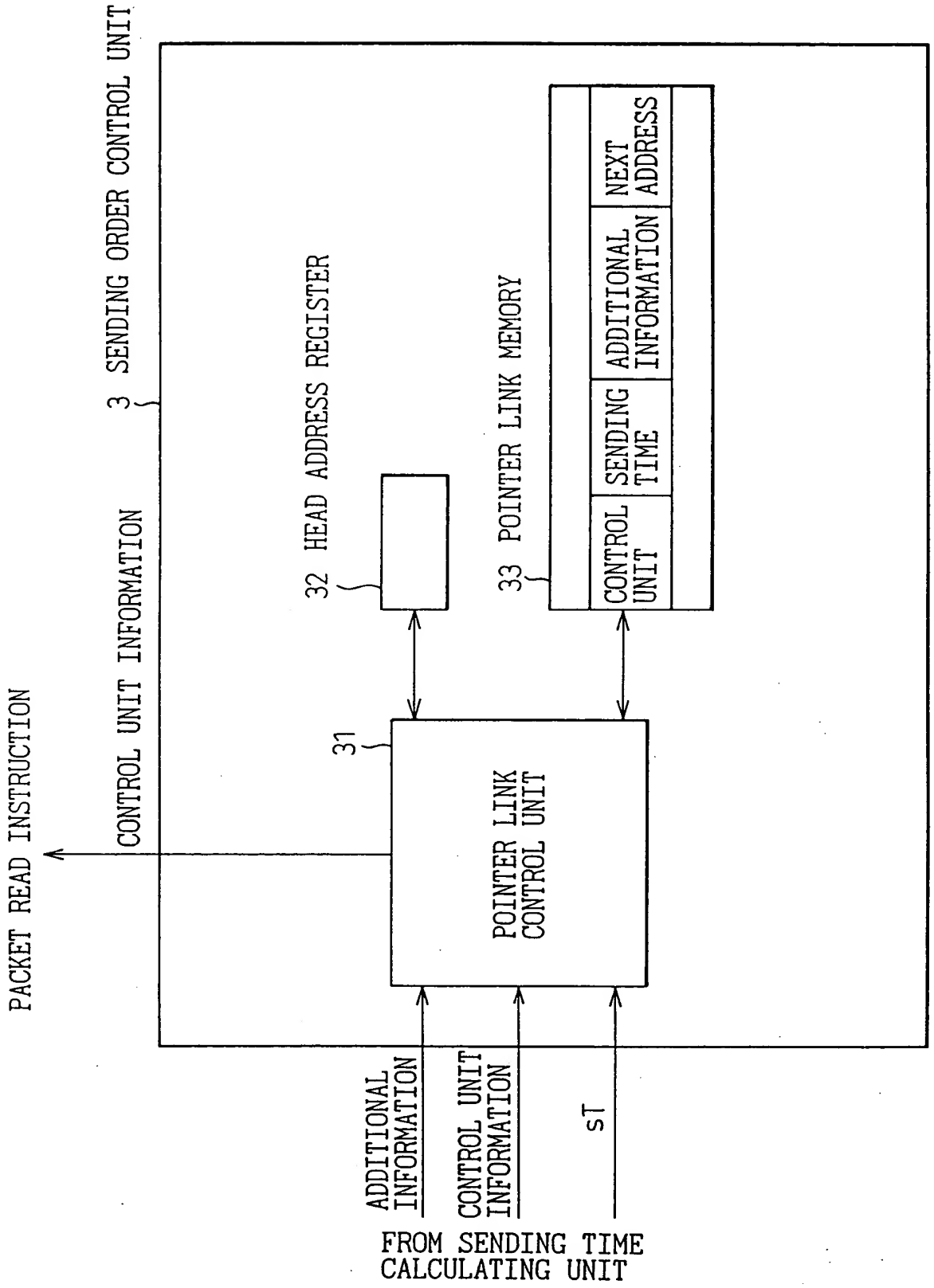

3 SENDING ORDER CONTROL UNIT
CONTROL UNIT INFORMATION
PACKET READ INSTRUCTION
32 HEAD ADDRESS REGISTER
33 POINTER LINK MEMORY
CONTROL UNIT
SENDING TIME
ADDITIONAL INFORMATION
NEXT ADDRESS
31
POINTER LINK CONTROL UNIT
ADDITIONAL INFORMATION
CONTROL UNIT INFORMATION
sT
FROM SENDING TIME CALCULATING UNIT

Fig.15

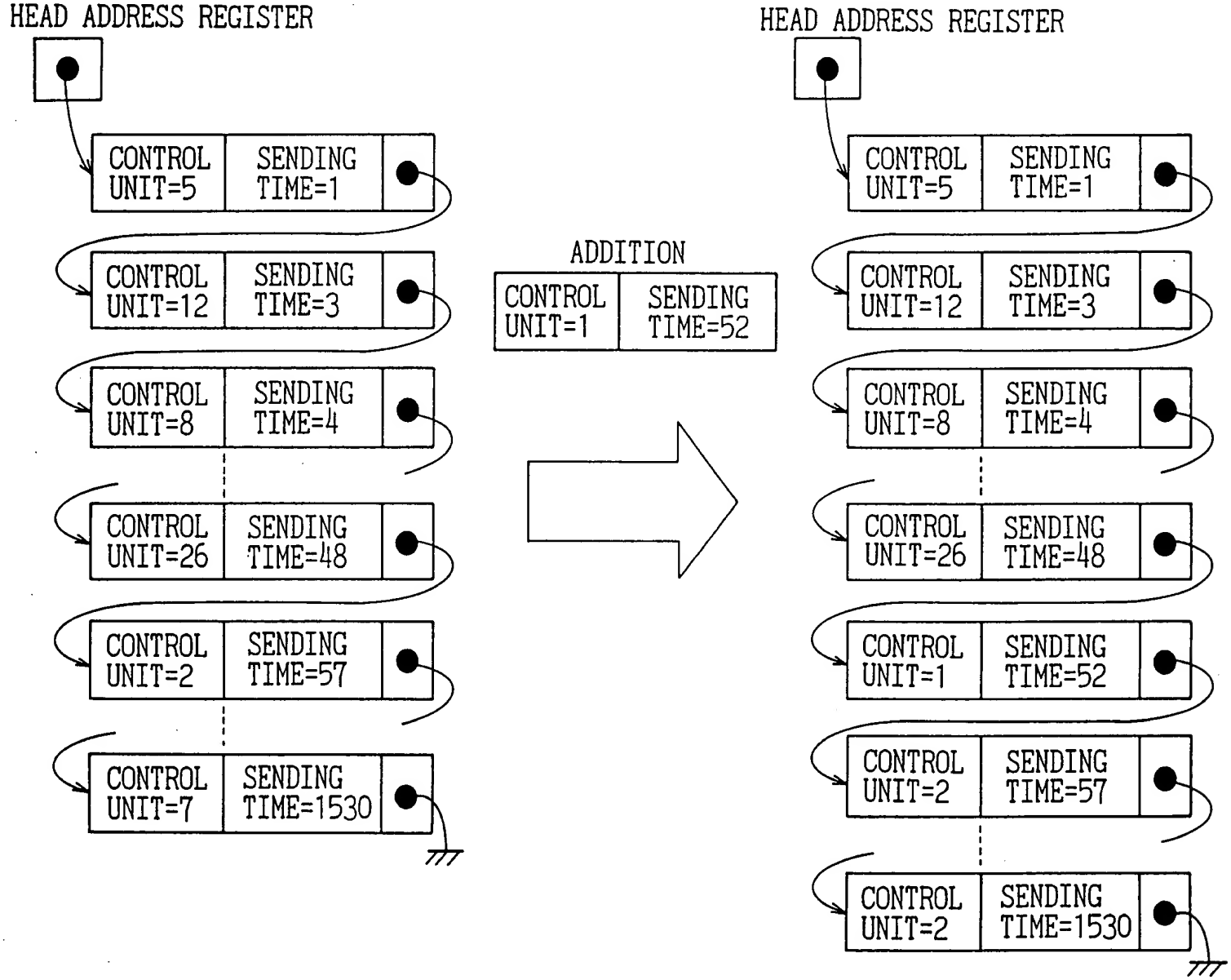

HEAD ADDRESS REGISTER
CONTROL UNIT=5
SENDING TIME=1
CONTROL UNIT=12
SENDING TIME=3
CONTROL UNIT=8
SENDING TIME=4
CONTROL UNIT=26
SENDING TIME=48
CONTROL UNIT=2
SENDING TIME=57
CONTROL UNIT=7
SENDING TIME=1530
ADDITION
CONTROL UNIT=1
SENDING TIME=52
HEAD ADDRESS REGISTER
CONTROL UNIT=5
SENDING TIME=1
CONTROL UNIT=12
SENDING TIME=3
CONTROL UNIT=8
SENDING TIME=4
CONTROL UNIT=26
SENDING TIME=48
CONTROL UNIT=1
SENDING TIME=52
CONTROL UNIT=2
SENDING TIME=57
CONTROL UNIT=2
SENDING TIME=1530

Fig.16

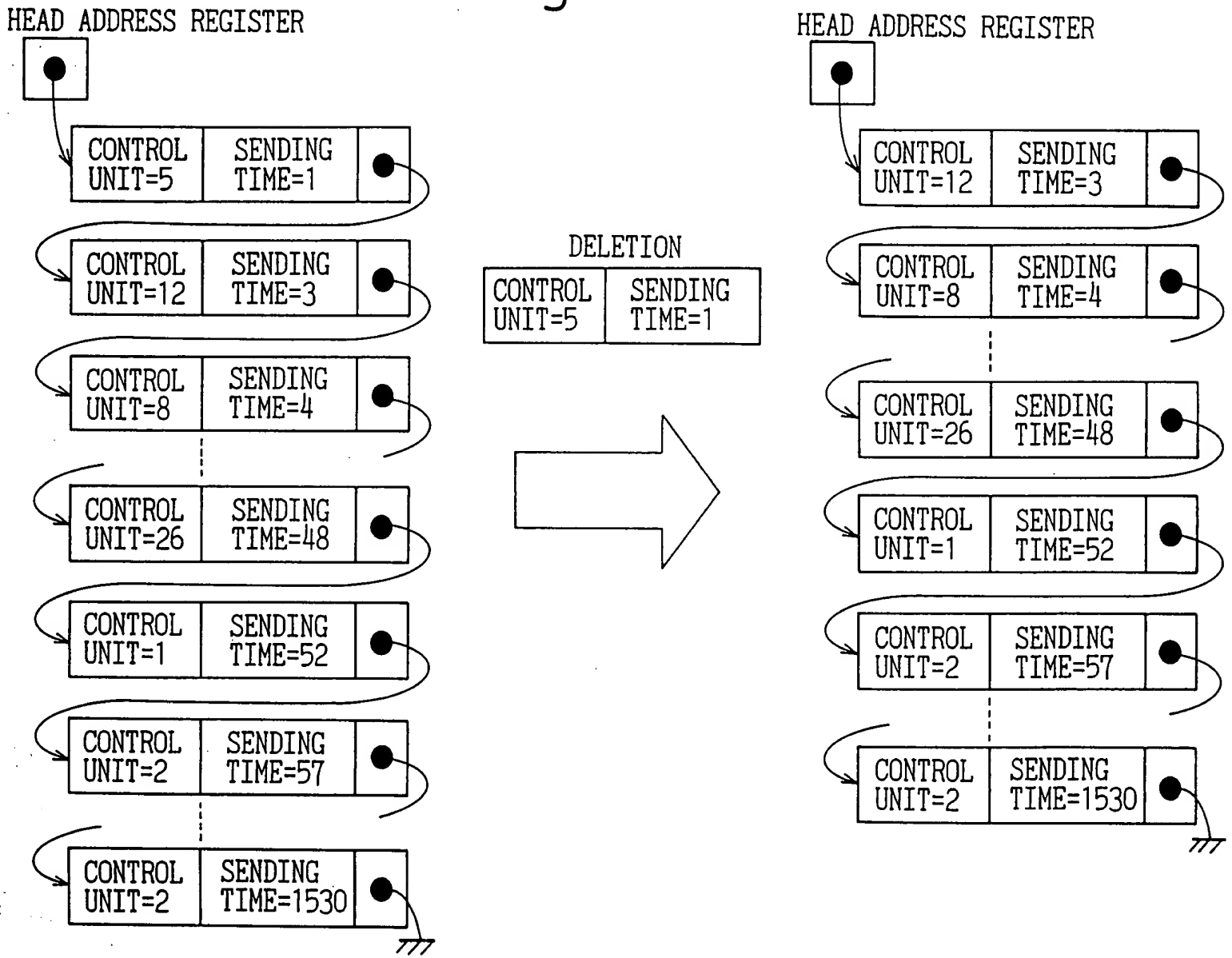

HEAD ADDRESS REGISTER
CONTROL UNIT=5
SENDING TIME=1
CONTROL UNIT=12
SENDING TIME=3
CONTROL UNIT=8
SENDING TIME=4
CONTROL UNIT=26
SENDING TIME=48
CONTROL UNIT=1
SENDING TIME=52
CONTROL UNIT=2
SENDING TIME=57
CONTROL UNIT=2
SENDING TIME=1530
DELETION
CONTROL UNIT=5
SENDING TIME=1
HEAD ADDRESS REGISTER
CONTROL UNIT=12
SENDING TIME=3
CONTROL UNIT=8
SENDING TIME=4
CONTROL UNIT=26
SENDING TIME=48
CONTROL UNIT=1
SENDING TIME=52
CONTROL UNIT=2
SENDING TIME=57
CONTROL UNIT=2
SENDING TIME=1530

Fig.17

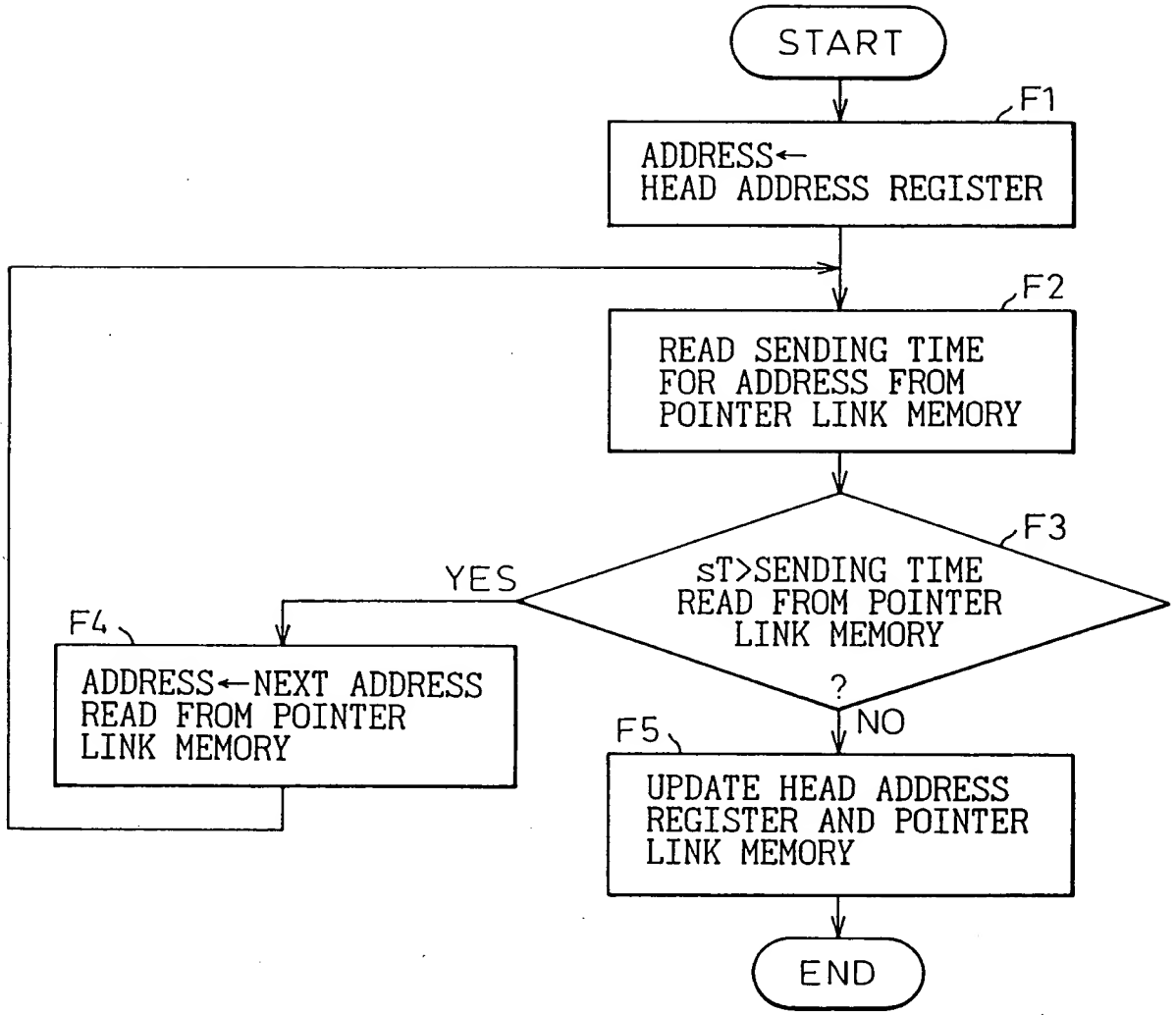

START
F1
ADDRESS←
HEAD ADDRESS REGISTER
F2
READ SENDING TIME
FOR ADDRESS FROM
POINTER LINK MEMORY
F3
sT>SENDING TIME
READ FROM POINTER
LINK MEMORY
?
YES
NO
F4
ADDRESS←NEXT ADDRESS
READ FROM POINTER
LINK MEMORY
F5
UPDATE HEAD ADDRESS
REGISTER AND POINTER
LINK MEMORY
END

Fig.18

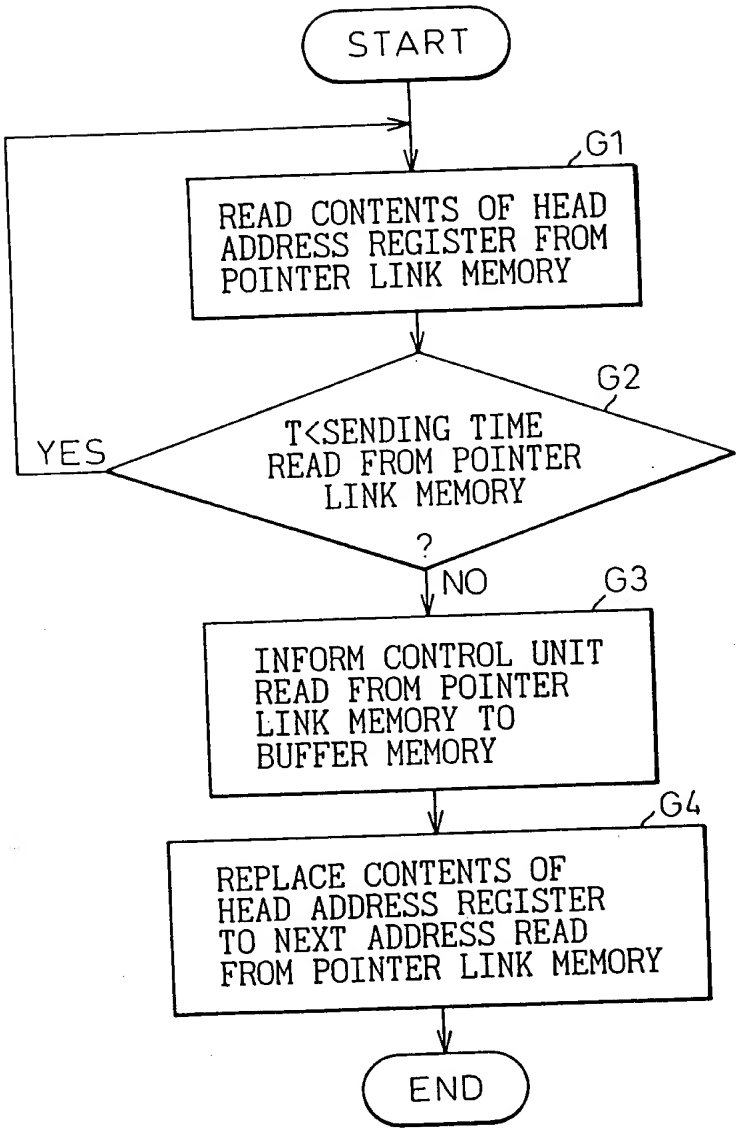

START
G1
READ CONTENTS OF HEAD ADDRESS REGISTER FROM POINTER LINK MEMORY
G2
T<SENDING TIME READ FROM POINTER LINK MEMORY
?
YES
NO
G3
INFORM CONTROL UNIT READ FROM POINTER LINK MEMORY TO BUFFER MEMORY
G4
REPLACE CONTENTS OF HEAD ADDRESS REGISTER TO NEXT ADDRESS READ FROM POINTER LINK MEMORY
END

Fig.19

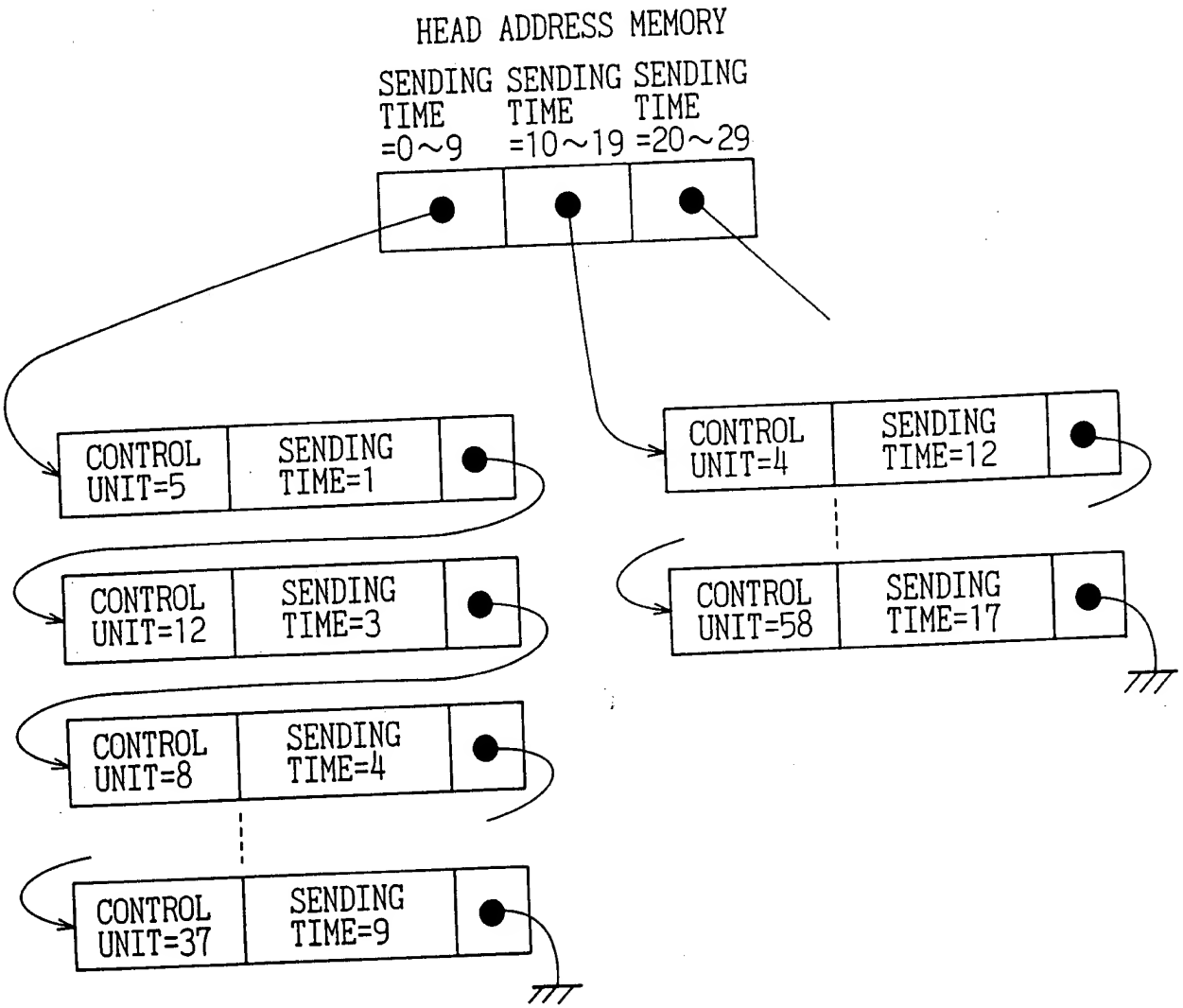


Fig.20

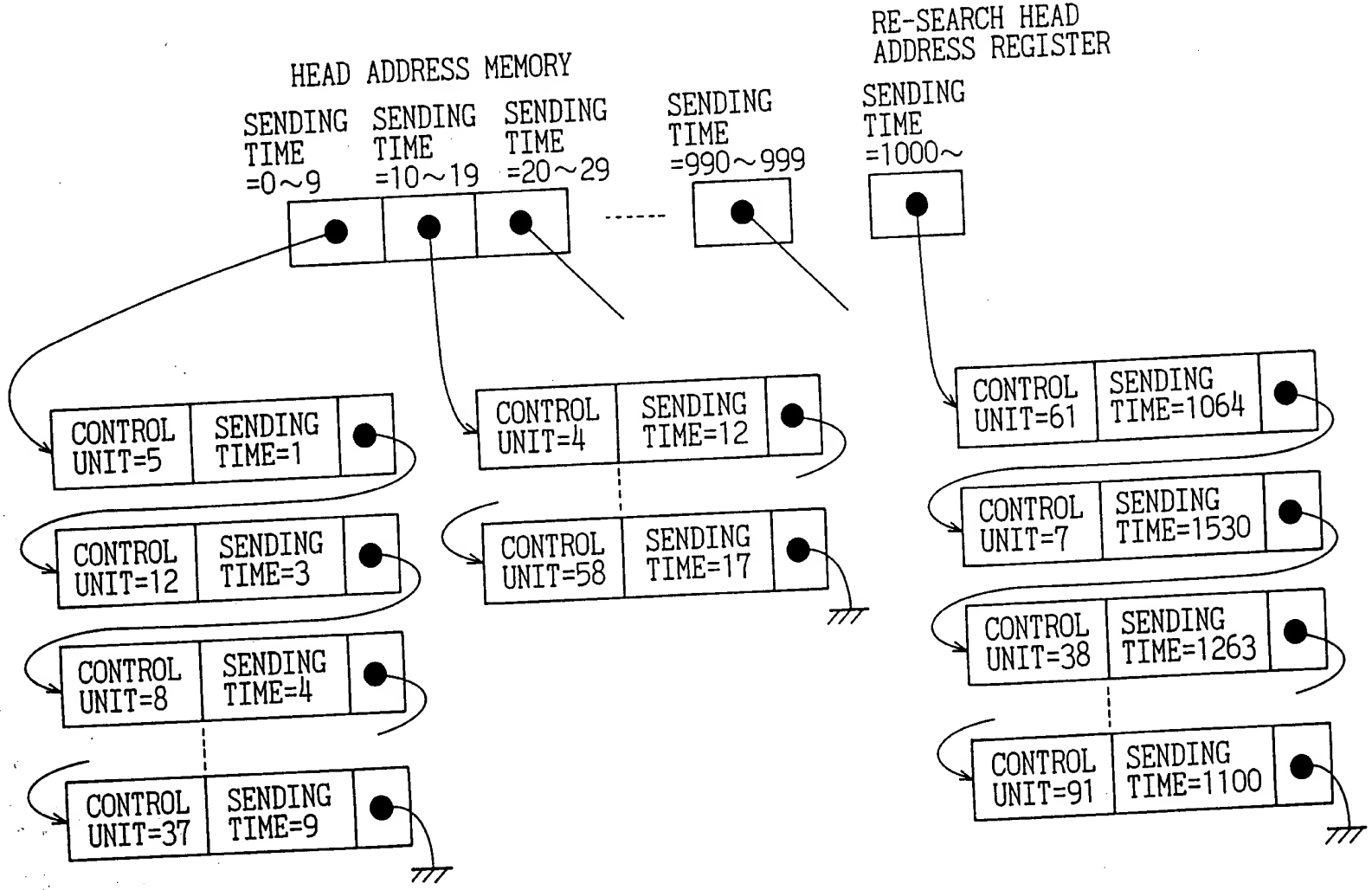


Fig.21

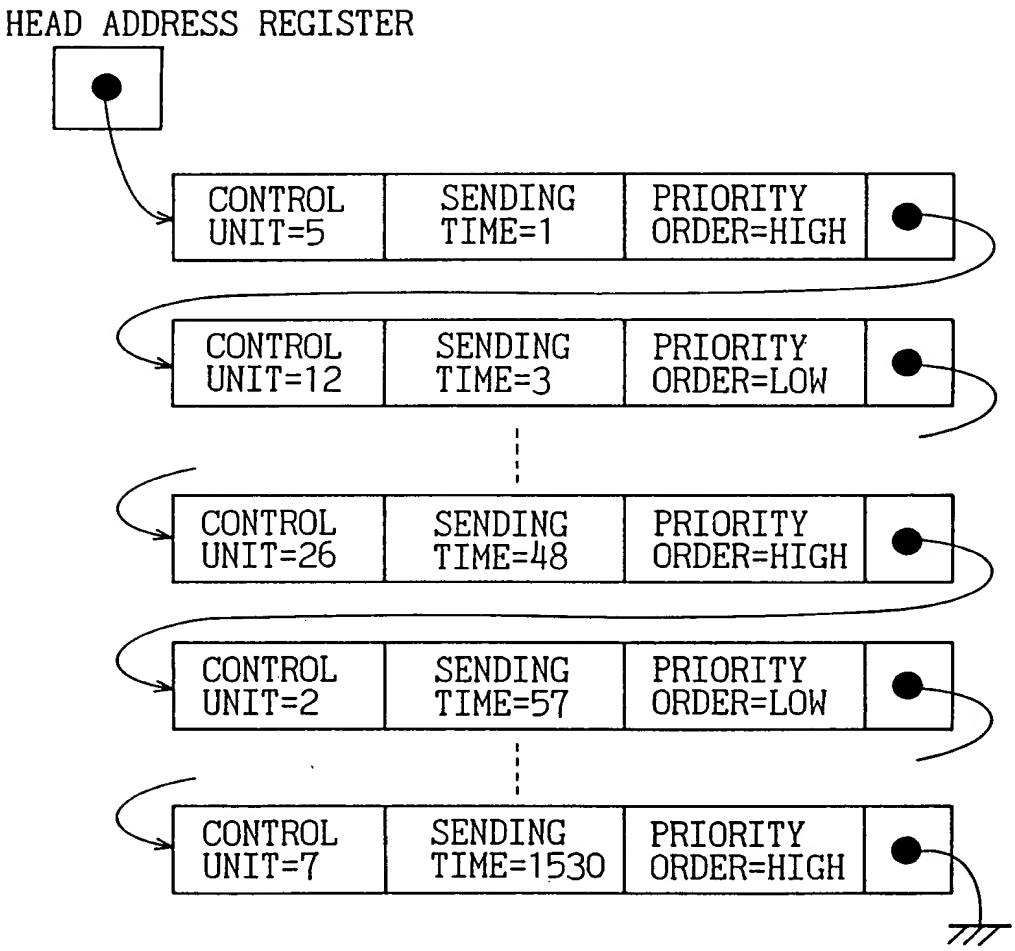

HEAD ADDRESS REGISTER
CONTROL UNIT=5
SENDING TIME=1
PRIORITY ORDER=HIGH
CONTROL UNIT=12
SENDING TIME=3
PRIORITY ORDER=LOW
CONTROL UNIT=26
SENDING TIME=48
PRIORITY ORDER=HIGH
CONTROL UNIT=2
SENDING TIME=57
PRIORITY ORDER=LOW
CONTROL UNIT=7
SENDING TIME=1530
PRIORITY ORDER=HIGH

Fig.22

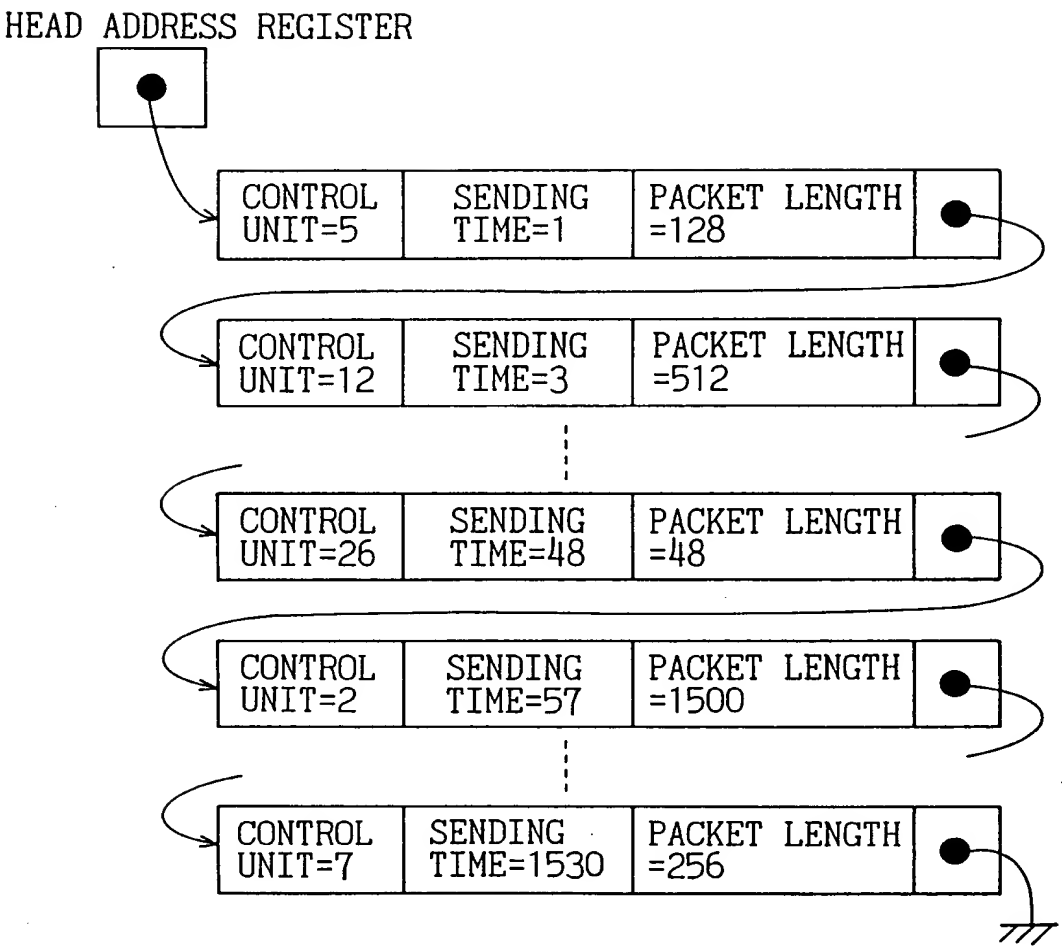
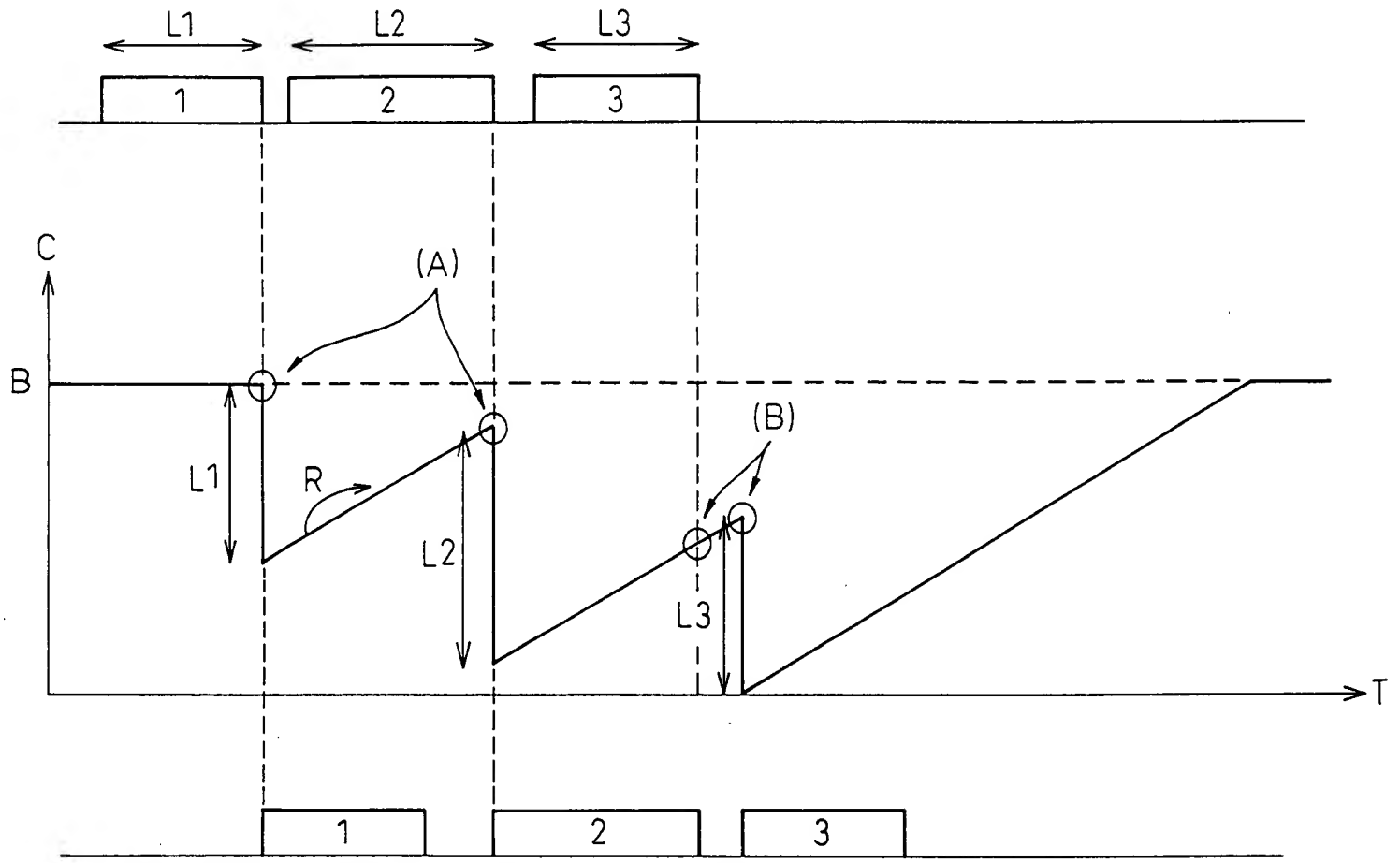

HEAD ADDRESS REGISTER
CONTROL UNIT=5
SENDING TIME=1
PACKET LENGTH =128
CONTROL UNIT=12
SENDING TIME=3
PACKET LENGTH =512
CONTROL UNIT=26
SENDING TIME=48
PACKET LENGTH =48
CONTROL UNIT=2
SENDING TIME=57
PACKET LENGTH =1500
CONTROL UNIT=7
SENDING TIME=1530
PACKET LENGTH =256

Fig.23 PRIOR ART




(A): SEND PACKETS 1,2 IMMEDIATELY, SINCE COUNTER VALUE IS LONGER THAN PACKET LENGTH.

(B): SEND PACKET 3 WHEN COUNTER VALUE IS L3, SINCE COUNTER VALUE IS SMALLER THAN PACKET LENGTH.